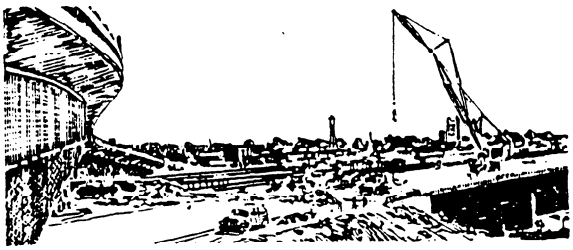
APPENDIX 5



BRIDGE CONSTRUCTION MEMO 100-3.0

CONCRETE MATERIALS AND MIXING

April 30, 1986

Volume II

TRANSIT-MIXED CONCRETE

In order to insure that batching and mixing of concrete which is placed in the permanent structures complies with the contract specifications, the following instructions covering inspections and documentation are to be followed.

Batch Plant Inspection

Each batch plant which furnished concrete to the project must be inspected for full compliance with the specifications. Document the inspection on Form DH-OS C54, or a similar district form, At least one plant inspection report must be in the project files before a significant portion of the work is done. Inspection reports are interchangeable between projects,

Batching and Mixing

Check the procedure for batching, charging mixers, mixing, delivery and discharge to insure that properly batched and mixed concrete is placed. This checking should be done at the beginning of the job and as often thereafter as conditions warrant. Document the checking by a separate diary covering the day or days on which it was done,

At least once during each concrete placing operation check the transit mix truck revolution count to verify proper mixing. Document the check(s) by an entry in the "Remarks" block of "Field Record for Concrete Pours" Form DH-OS C72 or the "Concrete Pour Record" Form DH-OS C73. Record the numbers of the trucks checked, time and results of check, In case of non-compliance indicate the action taken,

Load Tickets

At least once during each concrete placing operation check the load ticket for conformance with specification requirements. The checking of the tickets must be done at the time the truck arrives at the job site. Document this checking by indicating on the ticket that it has been checked, date, time, mixing revolution count and signature of the inspector.

Checking of Batch Weights

As provided in Section 90-5.03 of the Standard Specifications, the accuracy of batch weights shall be checked periodically by weighing a loaded transit mixer on platform scales, and after discharge weighing the empty truck to determine the tare and calculate the weight of the total batch. This weight should be compared with the weight of the materials placed in the truck at the batch plant. Corrective measures will be taken if the two weights are not in close agreement. This checking shall be done in conjunction with a unit weight test. The frequency of this check will depend on local conditions, but at least one check must be made every six months.

Since checks of this type are for the purpose of checking the accuracy of scales of a particular batch plant, the result of a check may be used for more than one project. Proper documentations must be in the files of each project concerned. In remote areas where there are no platform scales readily available, other means of checking the batch weights, or waiving of the check, may be authorized by the Structure Representative or the Bridge Construction Engineer. When different checking methods are used, or the checking is waived, this fact should be documented in the project records.

Variations in the prescribed procedure, to comply with local. district policy, or to avoid duplication of effort, are authorized provided the extent of checking and documentation are not adversely affected.

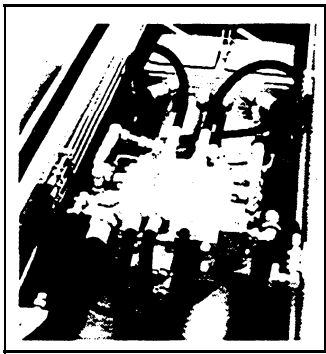
Rejected Transit-Mixed Concrete

When it is found necessary to reject transit-mixed concrete because it is improperly mixed, has excessive slump, is over-age, etc., the necessary steps must be taken to ascertain that the rejected concrete is not used elsewhere on the contract from which it was rejected, nor on any other adjacent State contracts.

SCHWING
AMERICA INC.

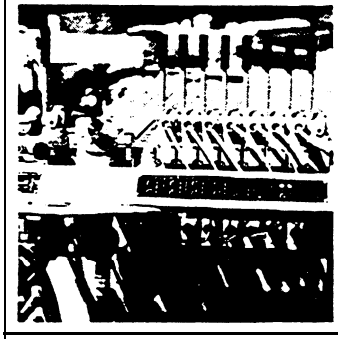
Truck mounted concrete pump with placing boom 1200 HDR KVM 42

The features you need for reliable concrete pumping with confidence at up to 196 cubic yards per hour

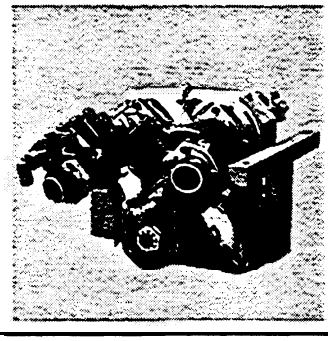


Hydraulic control block is the proven Schwing design providing millions of hours of service. This simple foolproof unit switches hydraulic flow without troublesome electronic devices.

Completely sealed waterbox for flushing cylinders features easy access for inspecting and changing pumping rams.

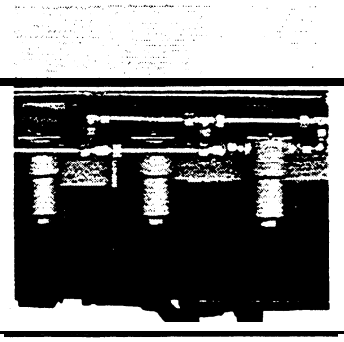


Controls for boom and pump are conveniently located for easy operator access on the pump's wide deck.

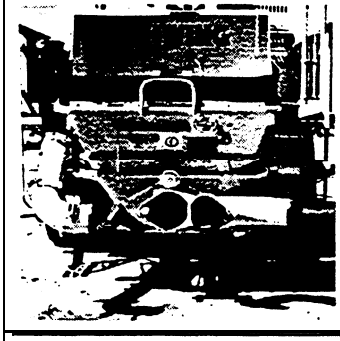


Unsurpassed reliability is based on Schwing-designed hydraulic system and Hydromatik hydraulic pump. Auxiliary pumps provide hydraulic pressure for agitator, water pump, boom, outriggers and optional air compressor.

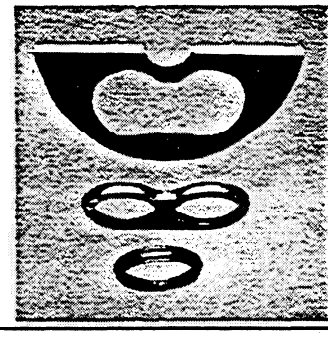
Fully hydraulic outriggers for fast and simple set-up and excellent stability in all boom positions. Outrigger controls are located on opposite sides of the unit. Operators can observe outrigger extension during set-up.



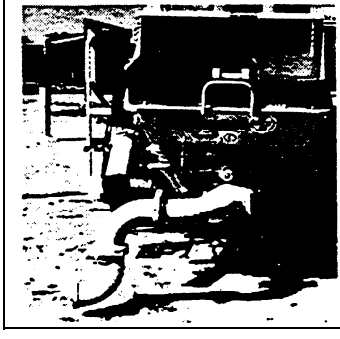
Easy access hydraulic filters screen down to 10 microns to protect system from contaminants.



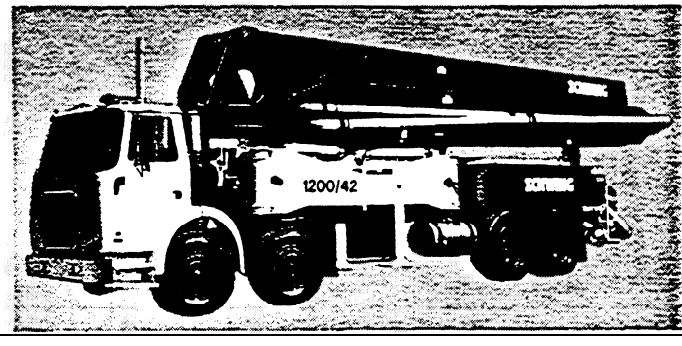
Discharge pipe swings away for fast. effective cleaning of the Rock Valve and housing. Convenient hinged clean-out doors are also incorporated.

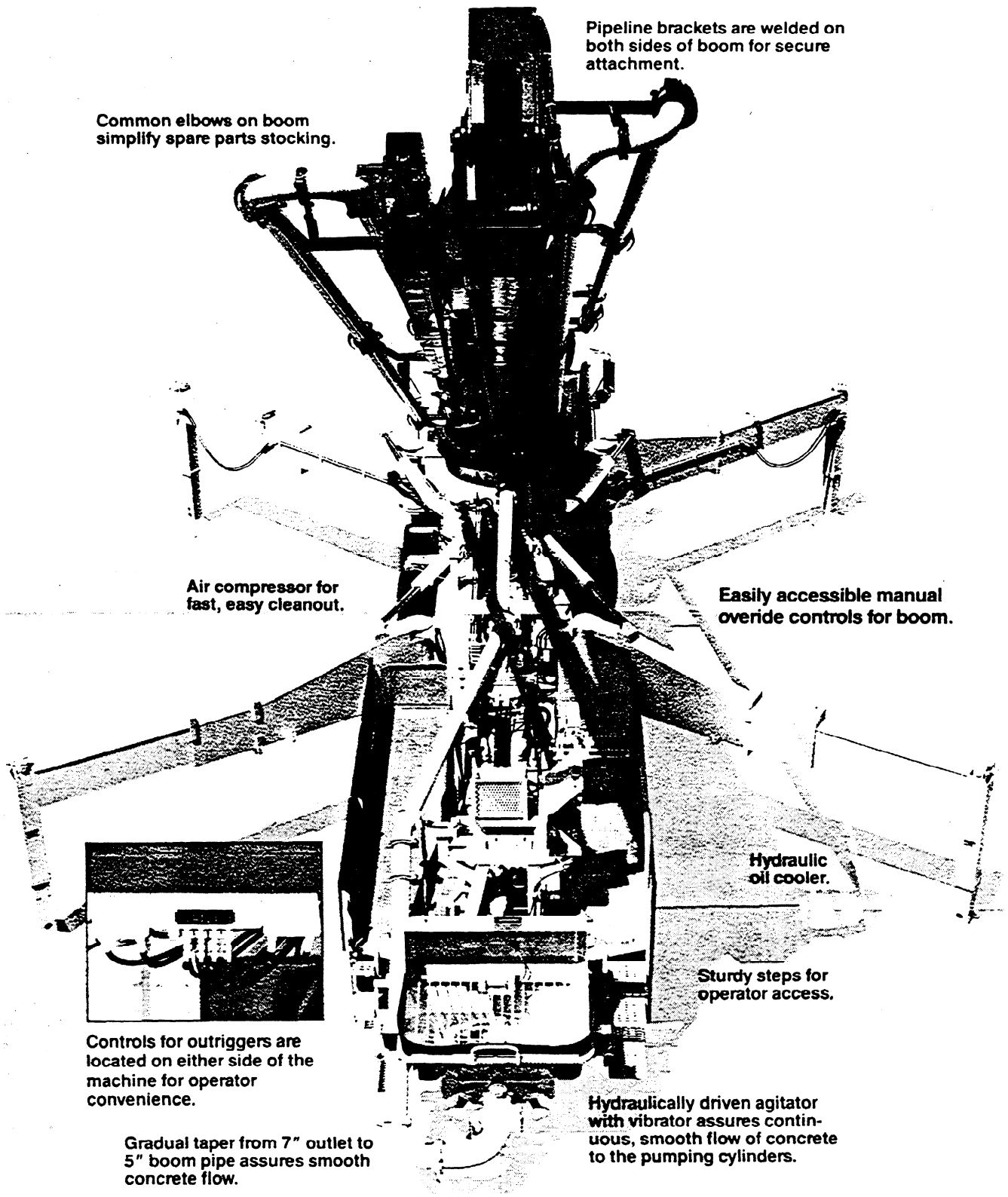


New 3-piece cutting ring design cuts cost for Rock Valve wear parts replacement. High quality tool steel assures long wear life.



Convert your Schwing from boom pump to line pump with the addition of a simple 90-degree outlet. This allows full utilization of the pump for high-pressure, long distance placements.



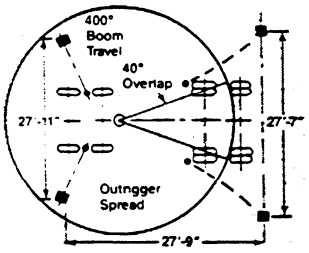

Pipeline brackets are welded on both sides of boom for secure attachment.
Common elbows on boom simplify spare parts stocking.
Air compressor for fast, easy cleanout.
Easily accessible manual overide controls for boom.
Hydraulic oil cooler.
Sturdy steps for operator access.
Controls for outriggers are located on either side of the machine for operator convenience.
Hydraulically driven agitator with vibrator assures continuous, smooth flow of concrete to the pumping cylinders.
Gradual taper from 7" outlet to 5" boom pipe assures smooth concrete flow.

Here's the most successful long boom in America for highrise, flatwork and bridges

Design

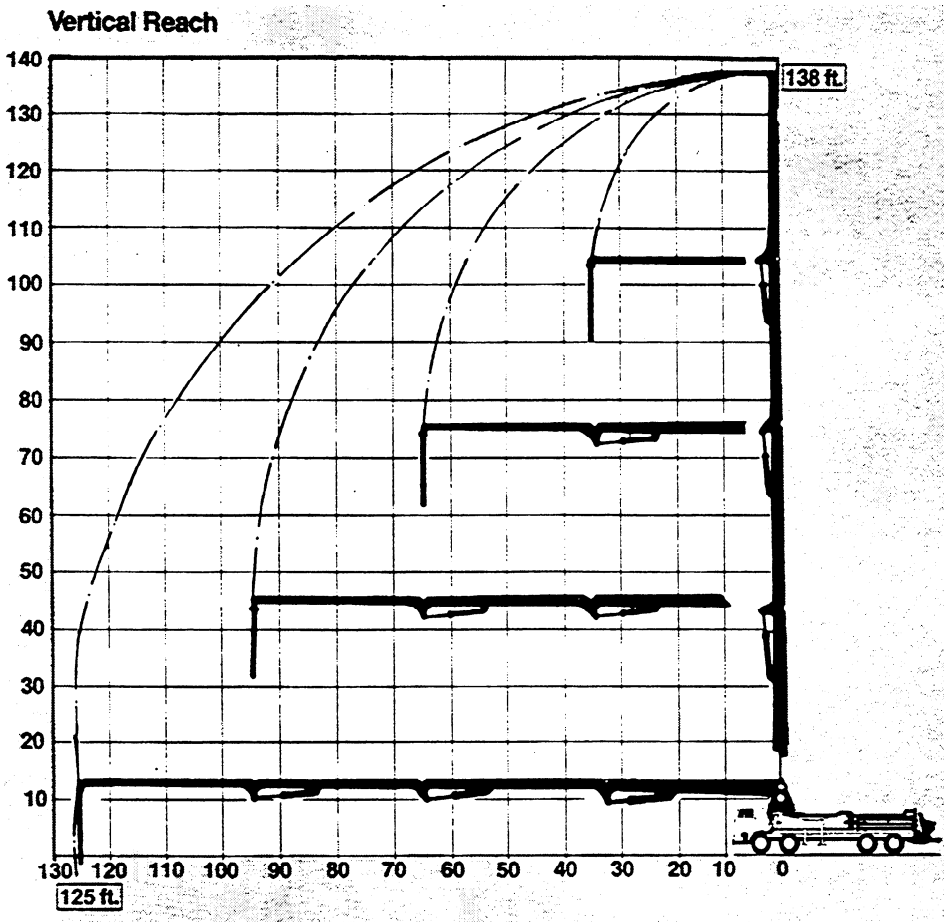
Schwing's fully articulating Roll and Fold boom allows concrete placement to all points with the slewing radius. Place straight out. straight up or downward and to all points between without dead spots or restricted posit ions.

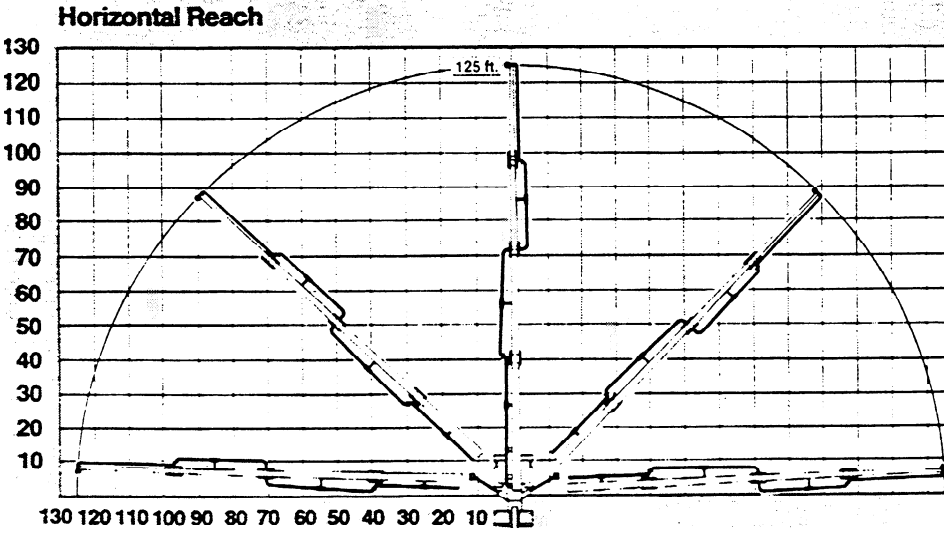
Wireless remote control allows up to five boom functions to be performed simultaneously. Unit can also be operated with 100-foot cable included with control box.

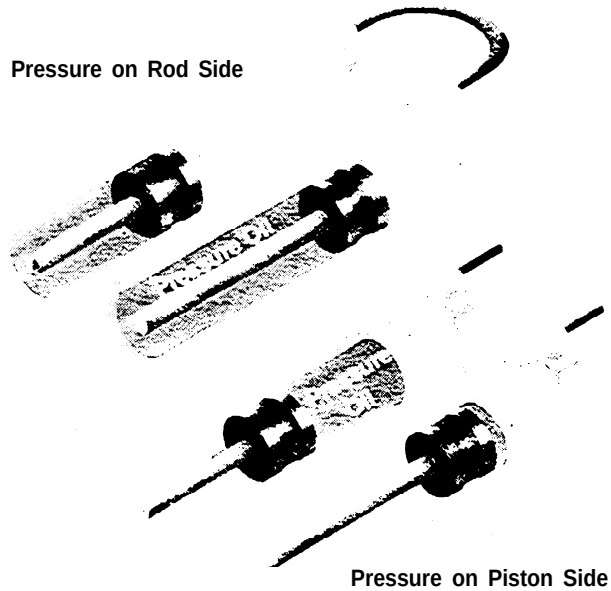


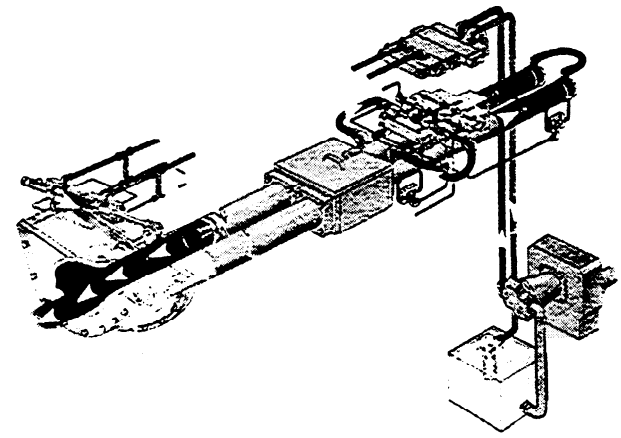
Maximum stability in the smallest space is provided by the outriggers

Schwing 42-meter boom reaches a full 125 feet horizontally for maximum coverage 0' flatwork and slabs







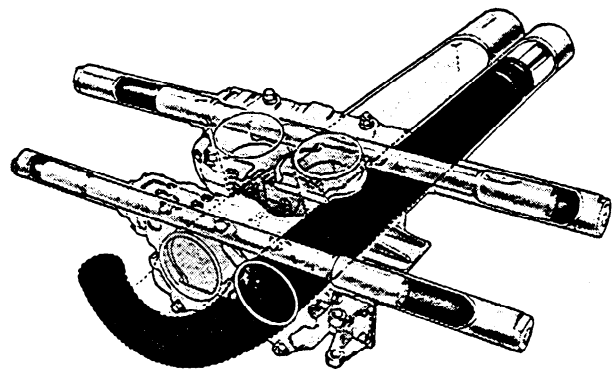


The BPL 1200 HDR is equipped with a hydraulic system which can be changed to provide greater volume of concrete or greater vertical and/or horizontal pumping distances. Hydraulic pressure is applied to the rod side of the cylinder piston head for greater volume or to the face of the piston head (high pressure side) for greater distance. This feature is only available on Rock Valve equipped units used for line pumping.

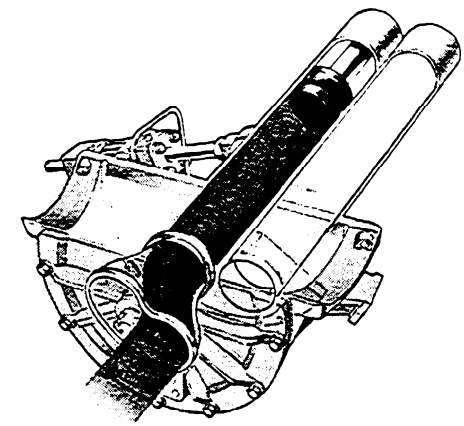
The twin-cylinder reciprocating pump pulls concrete from the hopper on the return stroke and pushes it into the pipeline on the forward stroke. The twin pistons alternate with long, stow stroking action to maintain a near constant pressure on the concrete. Cylinders can be switched end to end to extend wear life.

The ever popular and highly successful Gate Valve continues to be offered for specific applications and customer preference.

The revolutionary Rock Valve pumps everything from the harshest mixes to grout. Its unique design equalizes all forces in the valve, pumping concrete against the concrete, greatly reducing valve wear, while providing extraordinary sealing efficiency to prevent bleeding of fines. Valve cutting ring can be easily rotated 90 degrees for extended life.



Gate Valve



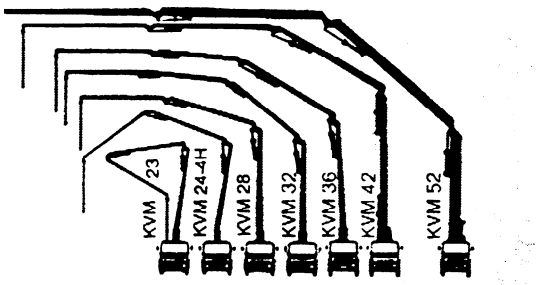
Rock Valve

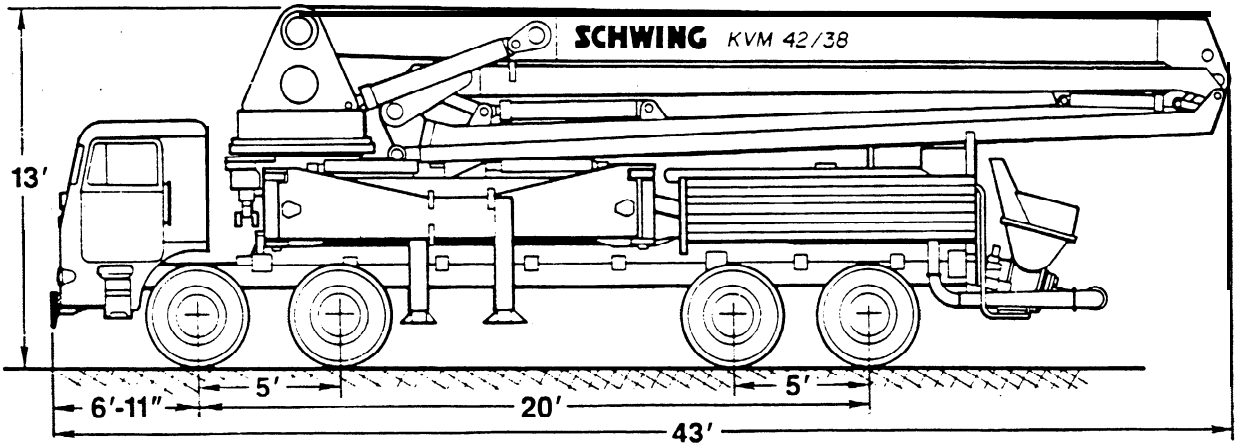
Technical Data

Concrete pump		1200 HDR
Theoretical Concrete Output, Hourly	Rod Side Piston Side	128-196 CY 83-111 CY
Max. Pressure on Concrete	Rod Side Piston Side	640 PSI 1165 PSI
Max. Horizontal Pumping Distance	Rod Side Piston Side	1000-Ft. 1700-Ft.
Max. Vertical Pumping Distance	Rod Side Piston Side	260-Ft. 480-Ft.
Max. Strokes/Min.	Rod Side Piston Side	30 17
Pump Cylinder Diameter		9
Pump Cylinder Stroke Length		79-in.
Max. Aggregate Size		2.5-in
Min. Concrete Slump		0-in
Placing boom		**KVM 42**
Pipeline diameter (inches)		5
Vertical reach (feet)		138
Horizontal reach (feet) from slewing axis		125
Reach from front of truck (feet)		115
Section Lengths First Section		33'10"
Second Section		30'4"
Third Section		30'4"
Fourth Section		30'4"
Slewing range (degrees)		400°
End hose length (feet)		12.5

Specifications are subject to change without prior notice.

FULL LINE





Represented by

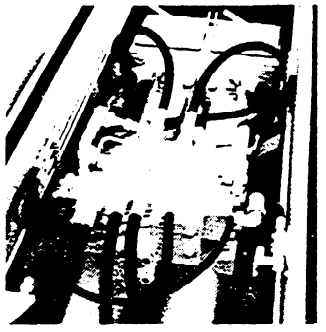
SCHWING AMERICA INC.

5900 Centerville Road
White Bear, MN 55127
612-429-0999
TWX 910-563-3539
FAX 612-429-3464

SCHWING
AMERICA INC

Truck mounted concrete pump with placing boom
BPL 900 HDR 1200 HDR
KVM 36

Concreting with confidence at up to 196 cubic yards per hour



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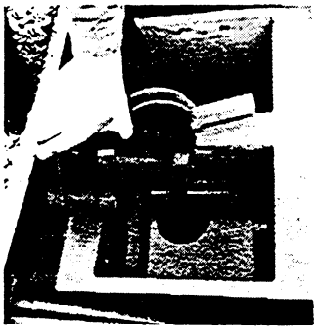
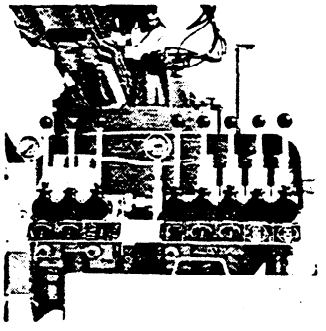
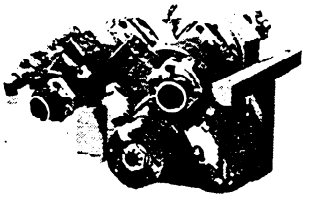


Completely sealed waterbox for flushing cylinders features easy access for inspecting and changing pumping rams.



Controls for boom and pump are conveniently located for easy operator access on the pump's wide deck.



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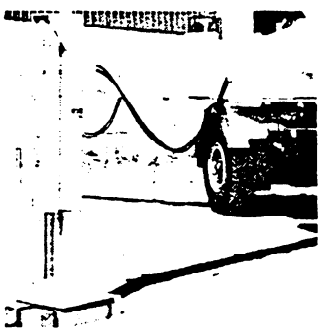

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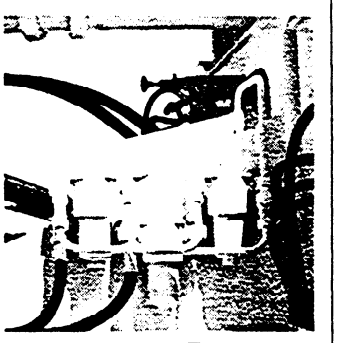

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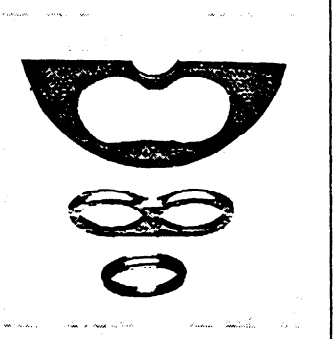

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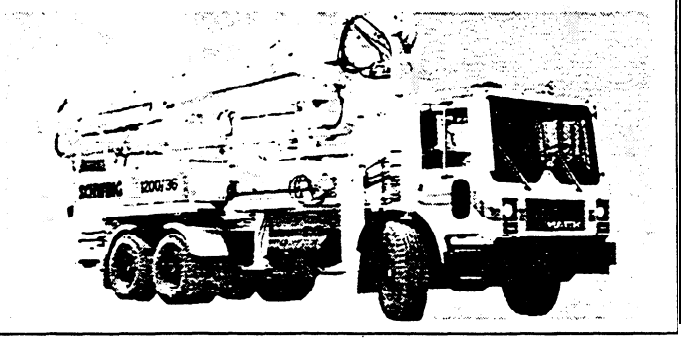

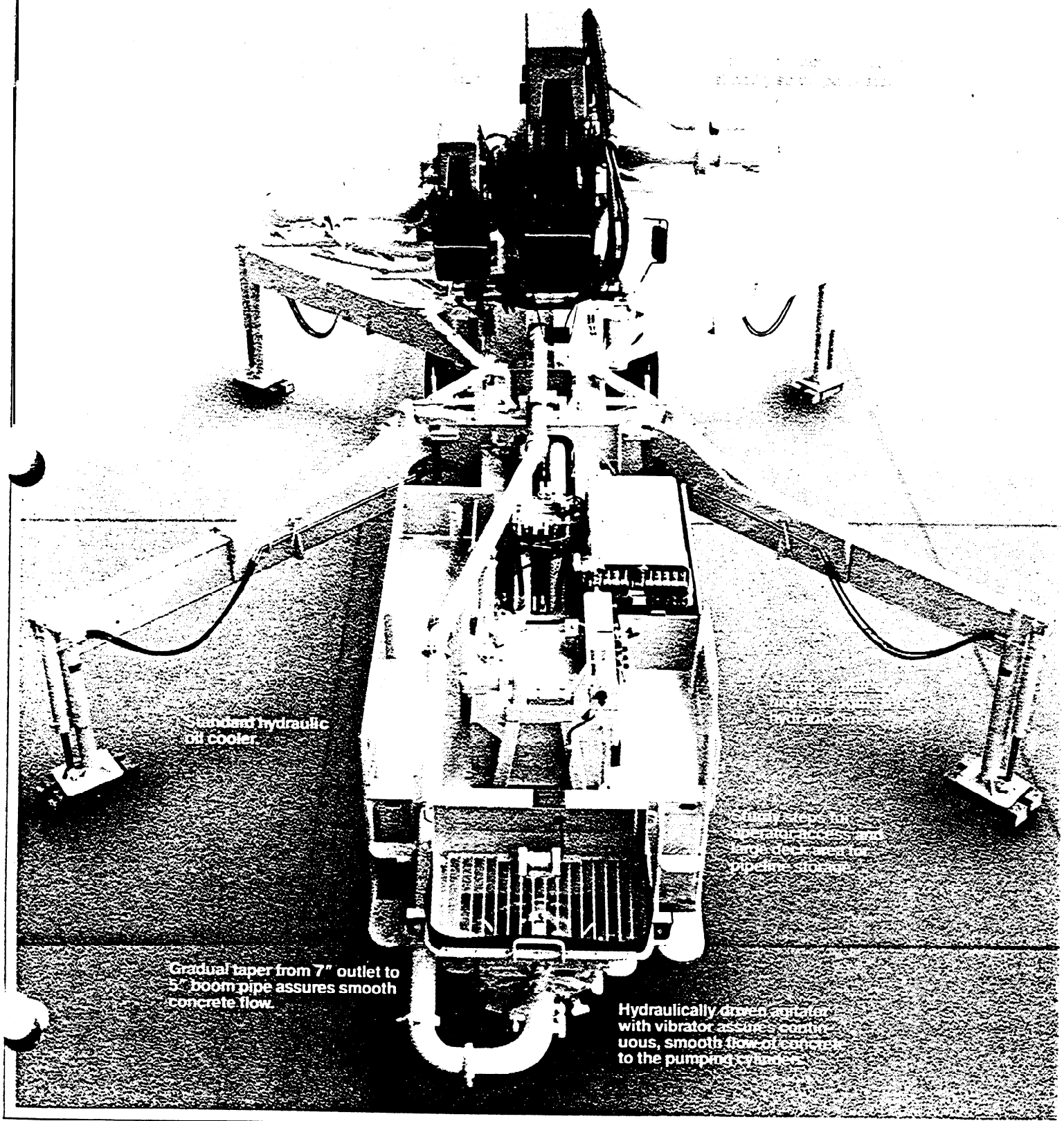
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A boom working range for highrise, flatwork and bridges

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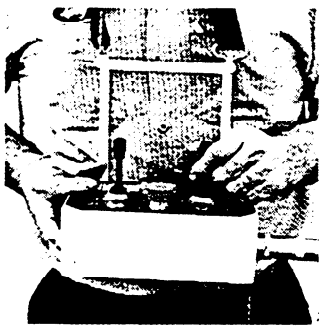
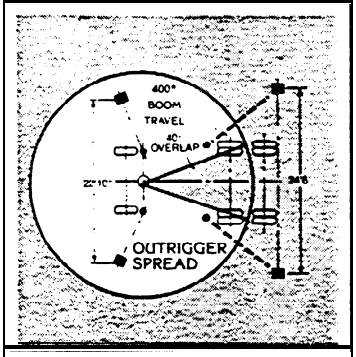
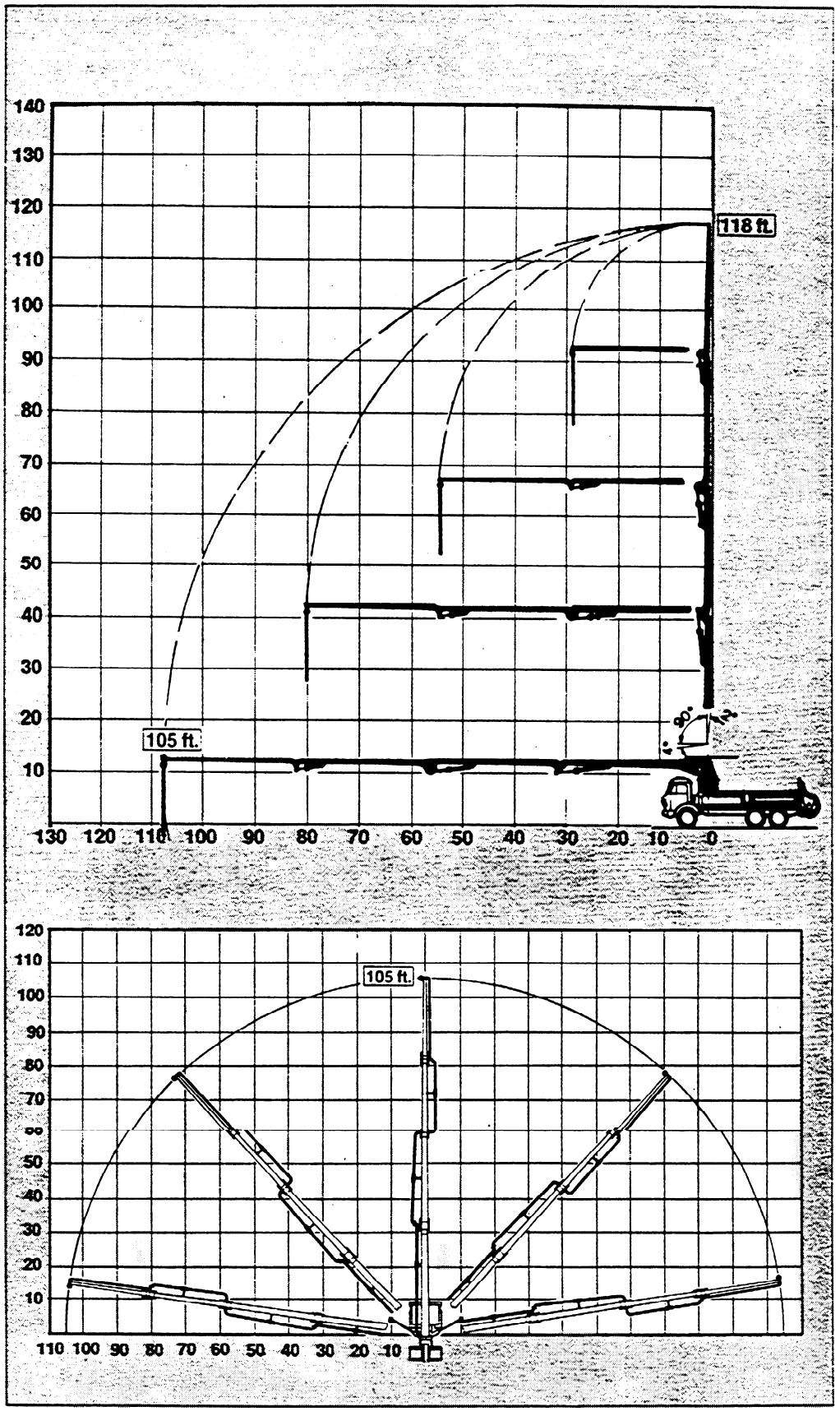


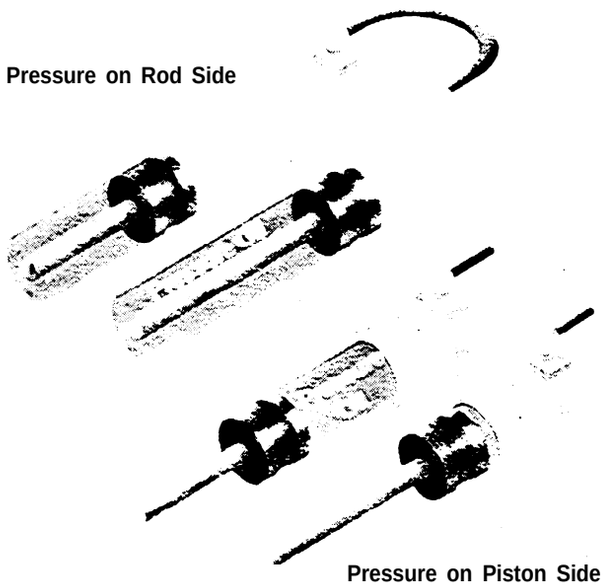
Remote control allows up to five boom functions to be performed simultaneously with 130-feet of extension cable standard. (Wireless remote optional.)

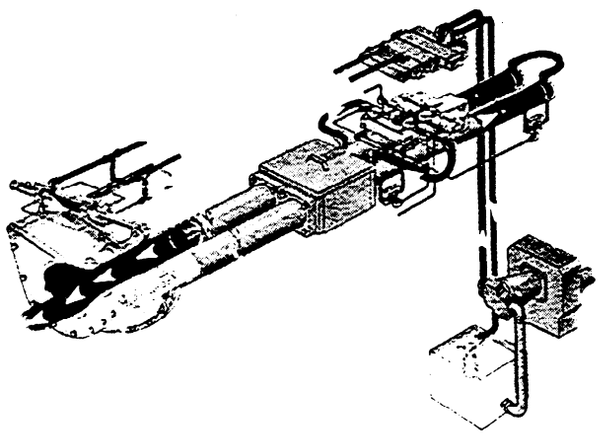


Maximum stability in the smallest space is provided by the outriggers.

Schwing 36-meter boom reaches a full 105 feet horizontally for maximum coverage of flatwork and slabs.







The BPL 900 HDR and BPL 1200 HDR are equipped with a hydraulic system which can be changed to provide greater volume of concrete or greater vertical and/or horizontal pumping distances. Hydraulic pressure is applied to the rod side of the **cylinder** piston head for greater volume or to the face of the piston head (high pressure side) for greater distance. This feature IS only available on Rock Valve equipment units used for line pumping.

The twin-cylinder reciprocating pump pulls concrete from the hopper on the return stroke and pushes it into the pipeline on the forward stroke. The twin pistons alternate with long, slow stroking action to maintain a near constant pressure on the concrete. Cylinders can be switched end to end to extend wear life.

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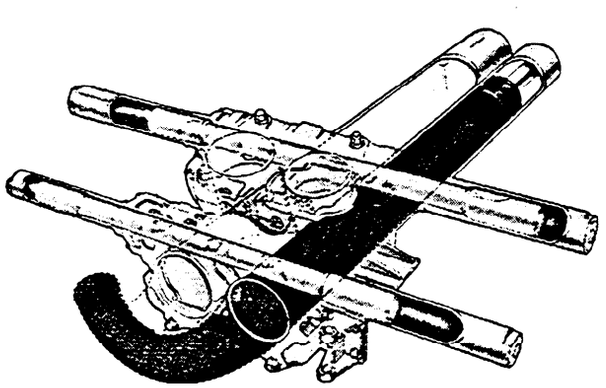
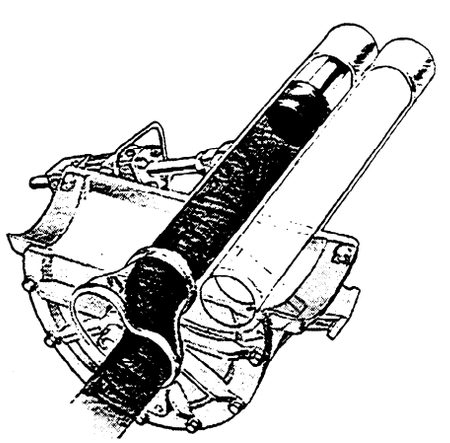


Gate Valve



Rock Valve

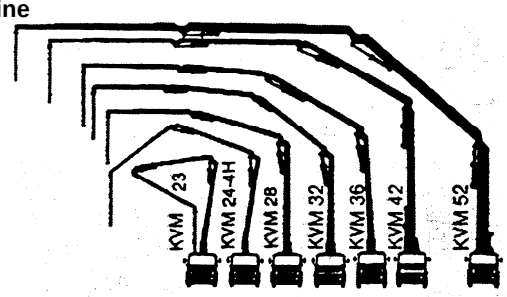
Technical Data

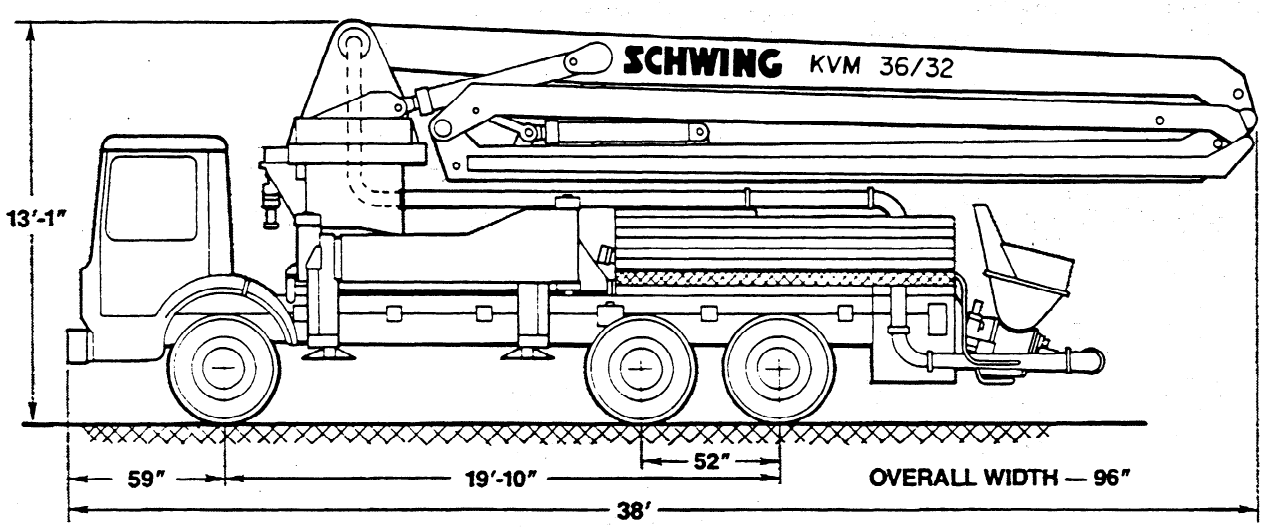
Concrete pump		900 HDR	1200 HDR
Theoretical Concrete Output, Hourly	Rod Side Piston Side	117 CY 67 CY	113-196 CY 83-111 CY
Max. Pressure on Concrete	Rod Side Piston Side	850 PSI 1536 PSI	640 PSI 1805 PSI
Max. Horizontal Pumping Distance	Rod Side Piston Side	950-Ft. 1700-Ft.	1000-Ft. 1500-Ft.
Max. Vertical Pumping Distance	Rod Side Piston Side	260-Ft. 450-Ft.	250-Ft. 420-Ft.
Max. Strokes/Min.	Rod Side Piston Side	30 17	23 15
Pump Cylinder Diameter		8	9
Pump Cylinder Stroke Length		63-in.	79-in.
Max. Aggregate Size		2.5-in.	2.5-in.
Min. Concrete Slump		0-in.	0-in.

Placing boom	KVM 36
Pipeline diameter (inches)	5
Vertical reach (feet)	118
Horizontal reach (feet) from slewing axis	105
Reach from front of truck (feet)	95
Section Lengths First Section	27′
Second Section	26′
Third Section	26′
Fourth Section	26′
Slewing range (degrees)	370°
End hose length (feet)	12.5

Specifications are subject to change without prior notice.

Full line





Represented by

SCHWING AMERICA INC.

5900 Centerville Road
White Bear. MN 55127
612-429-0999
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FAX 612-429-3464

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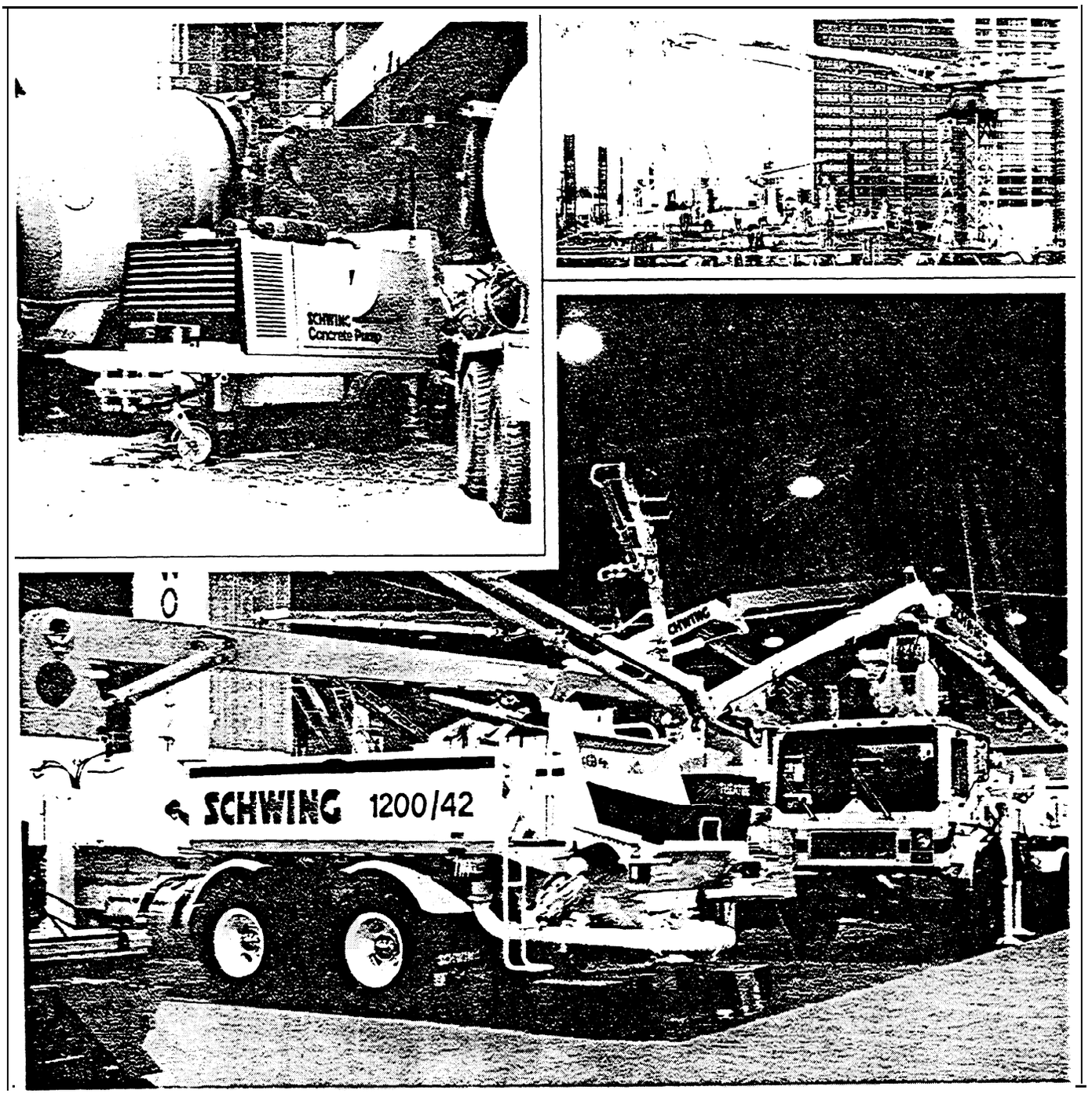
SCHWING
AMERICA INC.

Concrete pumps and placing booms Full Line

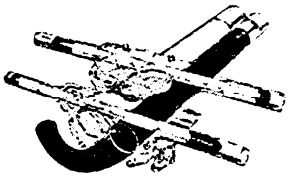


More than 1200 SCHWING boom pumps are operating successfully in North America. .

Two proven valve types

Rock Valve

Gate Valve

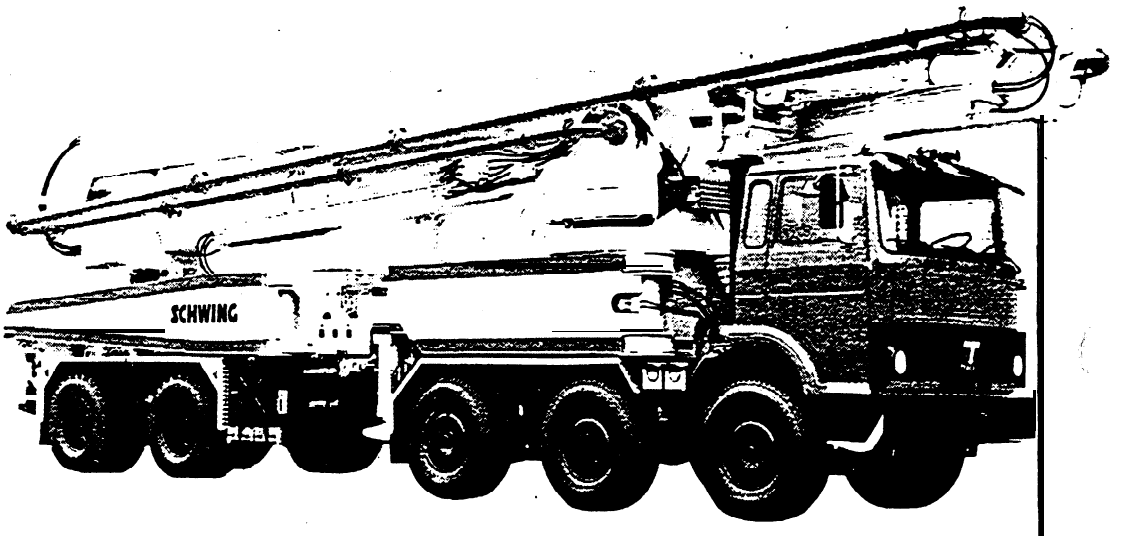


Only Schwing offers two proven valves for most models. Both valves pump a variety of mixes with exceptional reliability and low wear. Your Schwing representative will assist you in deciding which valve is best suited to your application.

K V M 5 2

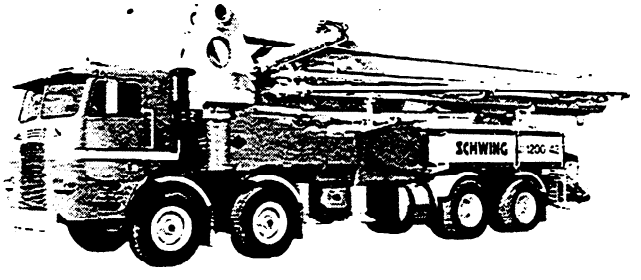
- **170 foot 4 section boom**
- **available with 1200 HDR Pump**

The reach of our 4-section 52 meter boom allows versatility for single set-up and efficient placement on highrise and flatwork. This extra long boom is mounted on a three steering axle chassis for maneuverability



KVM 42

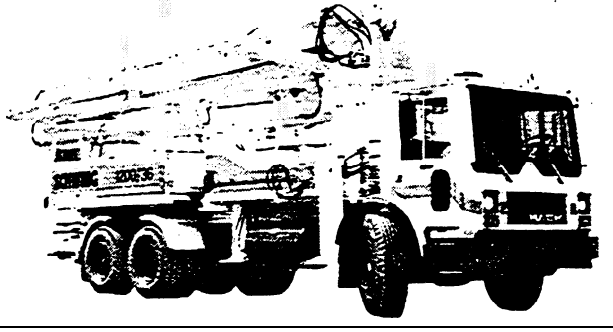
- **138-foot, 4 section boom**
- **available with 1200 HDR Pump**



Here's the 4-section long boom with all-around performance for fast, easy placement of bridge decks, slabs and buildings. Operator conveniences abound on the 42-meter which has an outstanding history of acceptance throughout the United States.

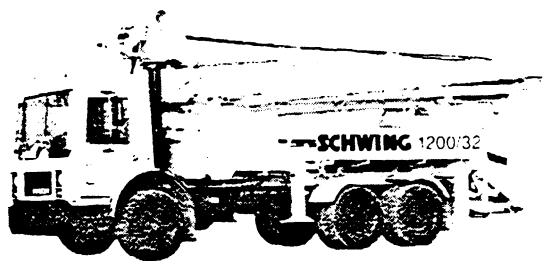
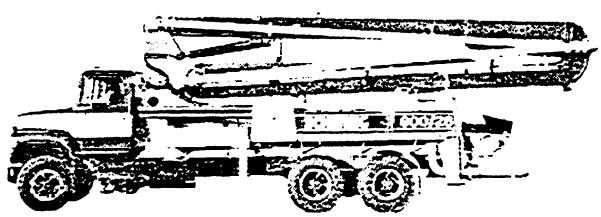
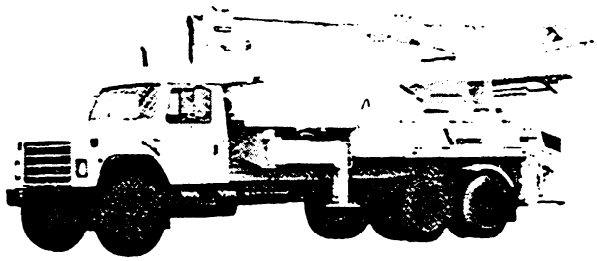
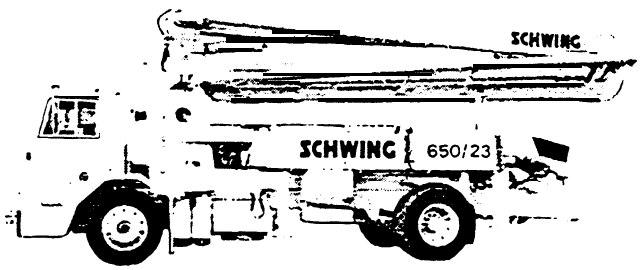
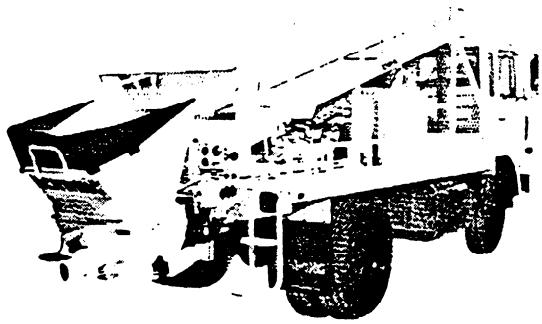
KVM 36

- **118 foot, 4 section boom**
- **available with 1200 HDR Pump**

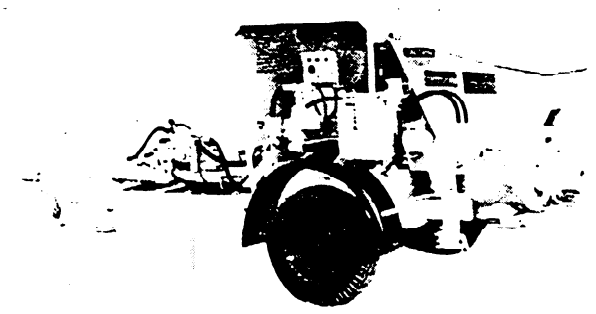
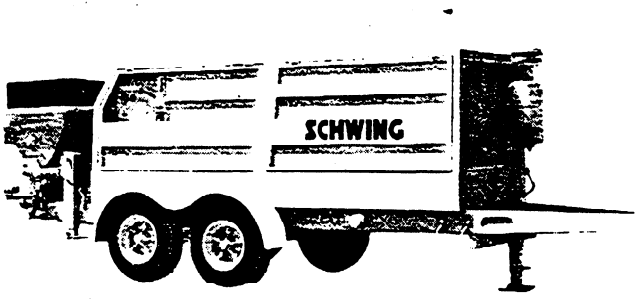
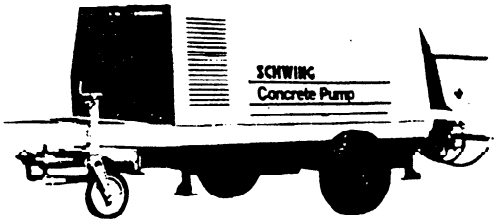
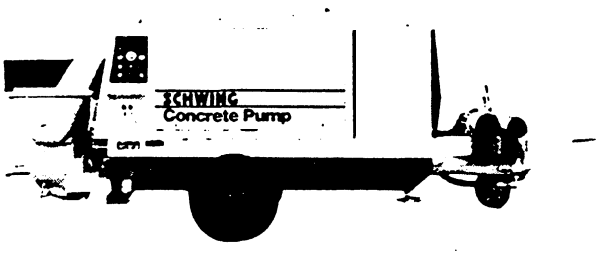
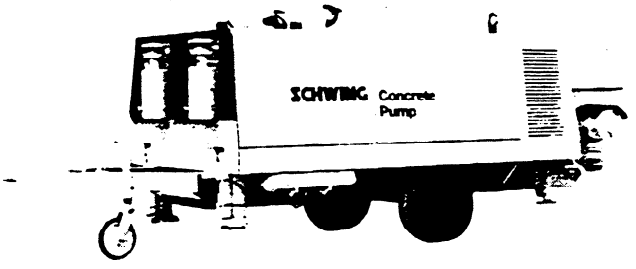


Full 4-section boom flexibility with reach to accomplish many pour requirements. The 35 meter mounts on a three axle chassis for cost efficiency while providing an excellent cost/performance value.

Backed by a nationwide distributor organization for reliable parts and service

KVM 32 • 105-foot, 4 section boom • available with 900 HDR or 1200 HDR pump		The 32-meter is a compact, four section boom design with big pump performance. Fast set-up and proven reliability make this unit ideal for most pump applications.
KVM 28 • 92-foot, 3 section boom • available with 801 HD, 900 HDR, and 1200 HDR pumps		The 28-meter boom model remains the most popular with the reach and output that means workhorse performance. The boom is detachable and mounts on standard separate placing boom towers and pedestals.
KVM 24 H • 79-foot, 4 section boom • available with 801 HD or 900 HDR pump		This 4-section boom is unique with its extremely low 16'2" unfolding height for placing in confined areas. The boom also features quick detach for remote mounting.
KVM 23 • 75-foot, 3 section boom • available with 650 HDR or 801 HD pump		Here's the quick hitter that offers excellent output through a 23-meter boom. Single axle truck mounting benefits maneuverability and economy.
BPL 750/1000		Convenient racks carry the pipeline for set-up on the project. This compact unit utilizes the truck engine for power to pump exceptional distances. Separate engine drive is also available.

SCHWING trailer mounted concrete pumps

BPA 750 **BPA 1000**		This small pump is a big performer in 750 or 1000 configuration. Both units equipped with the proven Rook Valve for reliable pumping of hardrock concrete or grout.
BPA 650 **BPA 901**		These all purpose pumps are available with Rock or Gate Valve and with six, seven or eight-inch diameter pumping cylinders for high volume or high pressure work. Choose diesel or electric power depending on your application.
BPA 3000 HDD		Pump at super-high pressures continuously with this unit featuring the proven Schwing Gate Valve. Choose diesel or electric power for vertical placements to 1,000 feet and horizontal pumping to 3,000-feet.
BPA 3000 HDR **BPA 3001 HDR**		This pump operates at pressures for everyday performance on highrise placements to 1,000-feet vertically or horizontal pumping to 3,000 feet. Many different configurations incorporating various pumping cylinder sizes and Rock Valve allow versatility for many pumping applications.
BPA 5000		Twin engine design puts the 5000 series in a class by itself for pumping long distances at high pressures. Six configurations are available to suit virtually every demanding pumping application. Available with both the Rock Valve and Gate Valve.

Specifications

BPL MODEL TRUCK MOUNTED PUMPS	650 HDR	801	900 HDR	1200 HDR-20†		1200HDR-23†	
Theoretical Concrete Output (C.Y./Hr.) Rod Side	86	107	117	128	147	171	196
Piston Side			67	78	83	104	111
Max. Pressure on Concrete (PSI) Rod Side	782	867	850	995	850	740	640
Piston Side			1535	1675	1535	1265	1165
Max. Horizontal Pumping Distance (Ft.)* Rod Side	850	1000	950	1100	1000	850	700
Piston Side			1700	1850	1700	1400	1300
Max. Vertical Pumping Distance (Ft.)* Rod Side	250	260	260	300	260	230	200
Piston Side			450	520	480	390	300
Max. Strokes/Min. Rod Side	36	31	30	26	30	26	30
Piston Side			17	16	17	16	17
Pump Cylinder Diameter (In.)	7	8	8	8		9	
Pump Cylinder Stroke Length (In.)	47	55	63	79		79	
Max. Aggregate Size (In.)**	1.5	2.5	2.5	2.5		2.5	
Min. Concrete Slump (In.)**	0	0	0	0		0	

* Pumping distances shown are to be used as a guide only since they have been considerably exceeded on specific projects. Maximum attainable distances depend upon concrete mix design and pipeline diameter. Maximum output and distance cannot be achieved simultaneously.
** Minimum slump and maximum aggregate size are dependent upon concrete mix design and pipeline diameter.
Pump specifications are for standard units. Other units are available.
† Model 1200 pumps available with optional differential cylinders for specific applications.

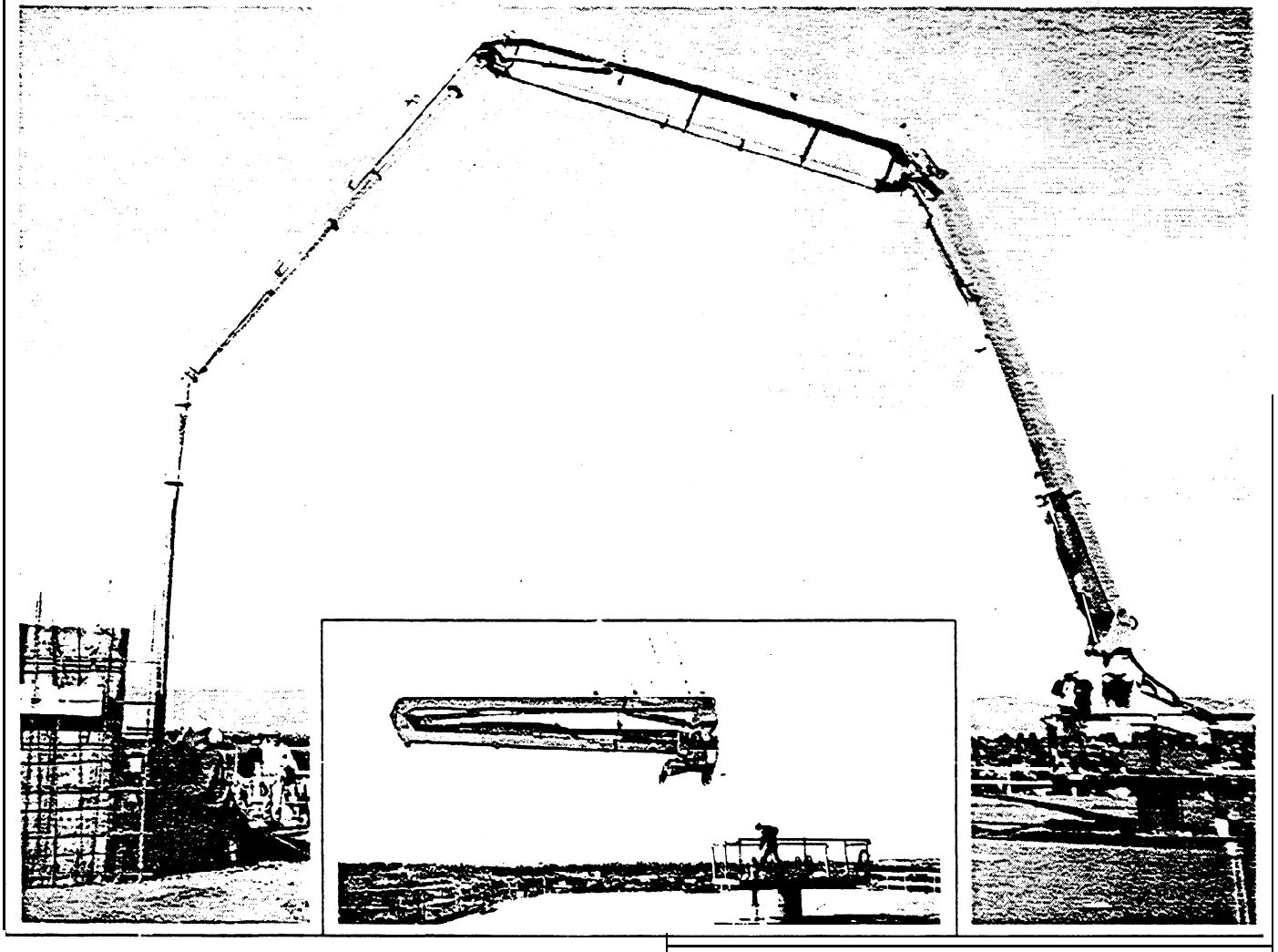
BPA MODELS		750R	1000R	650 HDD		650 HDR-18	901		3000 HDD		3000 HDR		3001 HDR		5000 HDD		5000 HDR		5000 HPR	
				-15	-18		D	R	-15	-20	-18	-20	-18	-20	-15	-20	-18	-20	-15	-18
Max. Theoretical Concrete Output (C.Y./Hr.)	(R)								68	118	102	126	102	126	87	150	128	157	87	128
	(P)	42	70	62	89	92	135	139	42	71	60	75	60	75	54	94	79	98	54	79
Max. Pressure on Concrete (PSI)	(R)								1700	985	1215	985	1215	985	1700	985	1215	985	1700	1215
	(P)	950	853	1542	1070	1070	867	867	2860	1666	2057	1666	2057	1666	2860	1666	2057	1666	2860	2057
Max. Horizonal Pumping Dist. (Ft.)*	(R)								2000	1000	1250	1000	1250	1000	2000	1000	1250	1250	2000	1250
	(P)	1000	940	2300	1300	1300	1000	1000	3000	1750	2100	1750	2100	1750	3000	1750	2100	2100	3000	2100
Max. Vertical Pumping Dist. (Ft.)*	(R)								500	300	350	300	350	300	500	300	350	350	500	350
	(P)	300	255	600	350	350	250	250	1000	450	575	450	575	450	1000	450	600	600	1000	600
Max. Strokes/Min.	(R)								30	30	32	32	32	32	40	39	40	40	40	40
	(P)	30	35	32	32	33	38	40	18	18	19	19	19	19	25	24	25	25	25	25
Pump Cylinder Dia. (In.)		6	7	6	7	7	8	8	6	8	7	8	7	8	6	8	7	8	6	7
Pump Cylinder Stroke Length (In.)		39	39	55	55	55	55	55	63	63	63	63	63	63	63	63	63	63	63	63
Max. Aggregate Size (In.)**		1½	1½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½
Min. Concrete Slump (In.)**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Pumping distances shown are to be used as a guide only since they have been considerably exceeded on specific projects. Maximum attainable distances depend upon concrete mix design and pipeline diameter. Maximum output and distance cannot be achieved simultaneously.
** Minimum slump and maximum aggregate size are dependent upon concrete mix design and pipeline diameter.
Pump specifications are for standard units. Other units are available.
R = Rod Side
P = Piston Side

Separate Placing Booms

Concrete placement for floors, walls and columns is easily and quickly accomplished wrth Schwing Separate Placing Booms mounted on crane towers, fixed pedestals or hydraulic self-climbing pedestals. Booms can be "flown" from one location to another, easily covering the entire area. KVM 28 can be ordered as a truck-mounted unit with pump and removed for pedestal or tower mounting

SEPARATE PLACING BOOM SPECIFICATIONS	KVM 28/24-125	DVM 32-125	DVM 42-125
Diameter of Pipeline (In.)	5	5	5
Max. Horizontal Reach (Ft.)	79	105	138
Number of Boom Sections	3	3	3
Main Boom Section	29'-1"	40'	66'2"
Middle Section	26'-5"	36'-9"	36'-7"
Tip Section	24'-3"	28'-3"	28'-2"
Slewing Range (Degrees)	370°	370°	720°
Boom End Hose Length (Ft.)	12	12	12
Boom Coverage @ 360° Radius (Sq. Ft.)	19,546	34,618	59,798



Represented by

SCHWING
AMERICA INC.

5900 Centerville Road
White Bear. MN 55127
612-429-0999
TWX 910-563-3539
FAX 612-429-3464